Joint Institute for Laboratory Astrophysics

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Dr. Nicholas White
Code 668
Laboratory for High Energy Astrophysics
NASA/Goddard Space Flight Center
Greenbelt, MD 20771

Dear Nick,

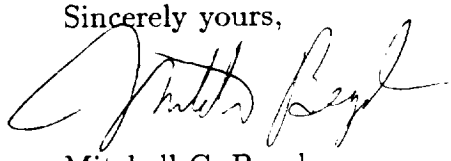
This is a final report on the Asca grant NAG 5-2592, entitled "X-ray Spectra of BAL Quasars" (Mitchell Begelman, PI, University of Colorado; Greg Madejski, co-PI, NASA/Goddard). The premise of our X-ray observation of the BAL quasar PG1416-129 using Asca was primarily to study the nature of the soft X-ray absorption in this object, and specifically to search for the X-ray signature of the Broad Absorption Lines observed in its ultraviolet spectrum. In addition, the unusual and interesting aspect of its X-ray emission, as measured by the Japanese Ginga satellite, was the fact that the 2–10 keV continuum spectrum appeared unusually hard, with a power-law energy index of ~ 0, while the more common value found in quasars is $\sim 0.8 - 1$.

We received the Asca data for this object. The X-ray emission was clearly detected, roughly at the level of 0.3 counts/sec in each of the Asca detectors. However, the X-ray spectrum is *not* as hard as the Ginga data indicated; instead, it is similar to that seen in other quasars, with the index of ~ 0.8. We thus either see a dramatic spectral variability over several years (between the Ginga and Asca observations), or the Ginga data for this rather faint source was dominated by uncorrected-for background or another source in the large Ginga field of view. Interestingly, the recently reported OSSE data (Stauber et al. 1996, A&A) also imply a hard spectrum, but again, the OSSE field of view is even larger than that of Ginga.

Further investigation of the ultraviolet data for this source implies that its BAL nature may be in question, since co-added IUE data do not show a significant absorption line. This is again consistent with essentially no X-ray absorption beyond the Galactic value as seen in the Asca data. It is of course possible that the strength of the absorption line is variable.

We are investigating both the Ginga and IUE data to develop a comprehensive spectrum of this object, and as soon as this investigation is complete, we plan to publish our results.

Sincerely yours,



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